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oped than in the lower orders of ferns would seem to favor the possibility of there being a primary unequal segmentation of the embryo.

BOTANICAL DEPARTMENT,  
CORNELL UNIVERSITY.

## Two Perfectly Developed Embryos on a single Prothallium of *Adiantum cuneatum*.

BY GEO. F. ATKINSON.

It is well known that several archegonia on a single prothallium of the ferns may possess fertilized eggs. In some cases more than one of them is known to begin embryological development, but it is quite rare that more than one becomes a perfectly developed embryo capable of forming an independent plant. The statement is sometimes made that while several archegonia may possess fertilized eggs never more than one embryo is perfectly developed.

Heinricher,\* in lighting prothallia both above and below, succeeded in causing the development of archegonia in numbers on both surfaces. In two cases two archegonia possessed fertilized eggs which developed into perfect embryos, one each above and below. This might be considered an abnormal condition induced from the peculiar condition of lighting.

Rauwenhoff† notes the development of two embryos on single prothallia of *Gleichenia*. In both of these cases, however, we are not informed of the comparative strength or advanced condition of growth of the embryos, so that it may be an open question whether both of the embryos on a single prothallium could have developed into independent plants.

Campbell‡ also observes two embryos on a single prothallium of *Osmunda*, but states that one was far in advance of the other, and would probably have starved it out before the two could obtain foothold in the soil.

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\* Heinricher, Beeinflusst das Licht die Organ-Auflage am Farn Embryos, Mitt heilungen des bot. Inst. zu Graz, Heft II., pp. 239-253.

† Rauwenhoff, De geslachtsgeneratie der Gleicheniaceen. Verh. d. Koninkl. Akad. van Wetensch. t. Amsterdam, 1889.

‡ Campbell, On the Prothallium and Embryo of *Osmunda Claytoniana* and *O. cinnamomea*, Ann. Bot. vi., 1892, 49-94.

In my studies of several species of the Polypodiaceæ I observed a prothallium of *Adiantum cuneatum* which showed two well developed cotyledons of apparently about the same age, and growing parallel to each other. Examining the specimen carefully it was noted that both cotyledons were attached to the under surface of the prothallium side by side, and that by the base of each was a young leaf the tip of which was rolled up in circinate fashion. Two well developed roots also issued side by side a little to the rear of the cotyledons. The roots were long and well fastened to the substratum. These parts gave every appearance of there being two perfectly developed embryos that were in fact two independent plants from the same prothallium. A sketch was made of the prothallium with its two plants. It occurred to me that possibly this apparent development of two perfect embryos side by side on a single prothallium might be some abnormal condition of a single embryo in which the stem and root, or possibly the stem and root segment, had forked at a very early period in its development. To be certain what the real condition of things was, the bulk of the cotyledons and roots was cut away and the prothallium with the young plants attached was cut in serial sections and mounted for examination. The sections were cut parallel with the axis of the prothallium and thus parallel with the embryo. From the point of passing in at one embryo to the issuing from the other all the sections were saved and arranged serially. A study showed two separate and perfect embryos, and they were so far advanced as to be able to exist independent of the prothallium.

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### Botanical Notes.

*Blephilia ciliata* (L.) Raf., in *Western New York*.—On July 2, 1893, I found a small tract of plants of *Blephilia ciliata* (L.) Raf., near Canandaigua, N. Y. The specimens grew in a low, rocky pasture adjoining a swamp. The plants were fine, being in full bloom at that time.

As nearly as I have been able to ascertain, *Blephilia ciliata* is